

## Review article

# Do not attempt cardiopulmonary resuscitation (DNACPR) orders: A systematic review of the barriers and facilitators of decision-making and implementation<sup>☆</sup>



Carole Mockford<sup>a,\*</sup>, Zoë Fritz<sup>b,c</sup>, Rob George<sup>d,e</sup>, Rachel Court<sup>a</sup>, Amy Grove<sup>a</sup>, Ben Clarke<sup>f</sup>, Richard Field<sup>b,g</sup>, Gavin D. Perkins<sup>a,g</sup>

<sup>a</sup> Division of Health Sciences, Warwick Medical School, University of Warwick, Coventry CV4 7AL, United Kingdom

<sup>b</sup> Division of Health Sciences, University of Warwick, United Kingdom

<sup>c</sup> Cambridge University Hospitals, NHS Foundation Trust, Box 148, CUH NHS FT, Hills Road, Cambridge CB2 0QQ, United Kingdom

<sup>d</sup> Cicely Saunders Institute, Kings College London, United Kingdom

<sup>e</sup> Palliative Care Guy's and St Thomas' Hospitals NHS Foundation Trust, Great Maze Pond SE1 7RT, United Kingdom

<sup>f</sup> Glasgow Medical School, University of Glasgow, Glasgow G12 8QQ, United Kingdom

<sup>g</sup> Heart of England, NHS Foundation Trust, Bordesley Green East, Birmingham B9 5SS, United Kingdom

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## ABSTRACT

Most people who die in hospital do so with a DNACPR order in place, these orders are the focus of considerable debate.

**Aim:** To identify factors, facilitators and barriers involved in DNACPR decision-making and implementation.

**Methods:** All study designs and interventions were eligible for inclusion. Studies were appraised guided by CASP tools. A qualitative analysis was undertaken.

**Data sources:** Included electronic databases: Medline, Embase, ASSIA, Cochrane library, CINAHL, PsycINFO, Web of Science, the King's Fund Library and scanning reference lists of included studies.

**Results:** Four key themes were identified:

Considering the decision – by senior physicians, nursing staff, patients and relatives. Key triggers included older age, co-morbidities, adverse prognostic factors, quality of life and the likelihood of success of CPR.

Discussing the decision – levels, and combinations, of physician and nursing skills, patient understanding and family involvement produced various outcomes.

Implementing the decision – the lack of clear documentation resulted in a breakdown in communications within health teams. Staff knowledge and support of guidelines and local policies varied.

Consequences of a DNACPR decision – inadequate understanding by staff resulted in suboptimal care, and incorrect withdrawal of treatment.

**Conclusion:** Significant variability was identified in DNACPR decision-making and implementation. The evidence base is weak but the absence of evidence does not indicate an absence of good practice. Issues are complex, and dependent on a number of factors. Misunderstandings and poor discussions can be overcome such as with an overall care plan to facilitate discussions and reduce negative impact of DNACPR orders on aspects of patient care.

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## 1. Introduction

When someone suffers sudden cardiac or respiratory arrest, cardiopulmonary resuscitation (CPR) may restart their heart and

breathing. CPR attempts can be traumatic: physically for patients and emotionally for their relatives. Under certain circumstances (no co-morbidities, 'shockable' cardiac rhythm, prompt start to CPR after cardiac arrest) CPR has a reasonable rate of success; however, when all CPR attempts are investigated this success rate becomes very low. Unsuccessful CPR often means that the person has a traumatic and undignified death. Even where the heart is restarted adverse outcomes include rib fractures, damage to internal organs, hypoxic brain damage and increased physical disability.

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\* Corresponding author.

National guidelines exist describing the context, setting and process for making informed decisions to omit CPR in certain circumstances.<sup>1</sup> These are known as “Do not attempt cardiopulmonary resuscitation” (DNAR/DNACPR) decisions and are made as part of an overall treatment plan with a person prior to a cardiac or respiratory arrest.

Epidemiological data indicate that the majority (>75%) of people who die in hospital do so with a DNACPR order in place.<sup>2,3</sup> In brief there are three situations where a DNACPR decision is appropriate:

- (i) When a patient makes an informed decision to decline CPR
- (ii) In situations where CPR is known to be ineffective
- (iii) When the doctor and patient (or relative if they are unconscious) together feel the burdens of CPR would outweigh the potential benefits.

For people close to death with an irreversible condition or when CPR would be ineffective a DNACPR decision facilitates a natural, dignified death. However, applying a DNACPR order inappropriately may deny the patient the chance (however small) of surviving a cardiac or respiratory arrest. Several recent high profile cases in the media highlight evidence of inconsistency and poor implementation across National Health Service (NHS) Trusts in the United Kingdom.<sup>4</sup> A review of current policy and practice is therefore required.

The findings from a recent scoping study and subsequent systematic review<sup>5</sup> informed the research question for the current review.

Objectives:  
To identify

1. Factors that influence DNACPR decision-making and who makes the decisions.
2. The barriers and facilitators to the decision-making process.
3. Factors that influence implementation of DNACPR orders.
4. The barriers and facilitators to the implementation process.

## 2. Methods

### 2.1. Protocol and registration

This systematic review has been registered – PROSPERO 2012:CRD42012002669.

### 2.2. Identification of studies

We used a broad search for studies on all aspects of DNACPR decision-making and implementation. The search strategy, was developed for MEDLINE with input from the study stakeholder group, and adapted as appropriate for other databases. All searches were undertaken between 12th and 19th July 2013 and covered papers published between January 2003 and July 2013. The final strategies used are available in [Appendix 1](#).

#### 2.2.1. Information sources

Studies were identified by searching: electronic databases; scanning reference lists of included studies; contacting key experts in the field. Databases searched: Medline [OVID], Medline In-Process and Other Citations [OVID], Embase [OVID], ASSIA [ProQuest], all sections of the Cochrane Library [Wiley] including CDSR, DARE, CENTRAL, NHS EED, HTA Database, CINAHL [EBSCO], PsycINFO [ProQuest], Science Citation Index and Social Science Citation Index [Web of Science], the King's Fund Library Database.

All bibliographic records identified through the electronic searches were collected in a managed reference database.

### 2.3. Inclusion criteria

*Study design:* All study designs.

*Types of participants:* Any health care professional who was involved in decision-making and implementation of DNACPR orders.

*Types of interventions:* Any intervention for DNACPR decision-making or implementation was included.

*Types of outcome measures:* The main outcomes were decisions and implementation.

*Country:* No restrictions were applied.

*Language:* Published in the English language.

### 2.4. Exclusion criteria

Papers were excluded if they were: abstract or conference proceedings, editorials, letters, think pieces, and commentaries; patient or surrogate experiences; pre-existing patient-led decision-making on DNACPR such as advanced decisions; individual case studies; simulations for training; hypothetical situations; vignettes; pre 2003 data (unless it crossed into 2003 and beyond); studies where DNACPR was not the primary focus; studies including children (under 18 years of age); non-English language publications.

### 2.5. Study selection

References ( $n = 3098$  after de-duplication) were screened independently for eligibility by four (two pairs) reviewers who assessed either the Medline abstracts (CM/BC) or abstracts from other databases (AG/RC). Disagreements were resolved by consensus (between AG/RC or CM/BC). Titles and abstracts for retrieved studies were screened for eligibility and full texts were obtained when the abstract was unclear. Studies which could not be decided upon were deliberated by a reviewer from the other pair of reviewers.

One reviewer (RC) and one independent reviewer (NW) checked 20% and 100% (respectively) of the second sift of abstracts ( $n = 603$ ) prior to obtaining full text papers for inclusion.

Agreement was reached on 146 of the papers to be set aside as of borderline interest. These were records that do not include data on the DNACPR process or were too broad e.g. about end of life care and CPR. Full text papers ( $n = 148$ ) were further assessed for eligibility and 101 were excluded with reasons e.g. data were collected prior to 2003.

### 2.6. Data extraction

Using provisional themes which had emerged from the second sift of abstracts, a broad framework was devised for data extraction (see summary measures) and checked with stakeholders by email for any other expert input. This comprehensive framework allowed for additional themes to emerge from the data extraction. A data extraction sheet was developed and pilot tested on randomly selected studies (BC) and refined accordingly. One review author (CM) extracted the following data: aims and objectives, research methods, participant characteristics, intervention, data collection and analysis, and results based on the framework. Fifteen papers (32%) had data extracted by other reviewers (RF, RC, BC and ZF) and checked by the main reviewer (CM).

### 2.7. Risk of bias in individual studies

Study quality and risk of bias were evaluated in individual studies and guided by the Critical Appraisal Skills Programme (CASP) tool<sup>6</sup> for qualitative studies. Due to the heterogeneity of the research methods which were mostly descriptive, and to provide a

common comparison of studies, adjustments were made to accommodate all other research methods.

## 2.8. Summary measures

Data were extracted which addressed the following: information about DNACPR forms; staff members and their role in DNACPR decision-making; timing of decision-making e.g. early, late or emergency orders; consultations with patients, surrogates or team members; compliance with guidelines or policies including a brief description of these; interpretation of the DNACPR order e.g. levels of care; description of the documentation used or how decisions are communicated; description of the implementation of the order e.g. who does this and how; clinical and patient factors considered in decision-making; skills and characteristics of decision makers; other outcomes such as resources and costs.

## 2.9. Planned methods of analysis

The diversity of the research methods used in the review studies did not lend itself to a meta-analysis. Analysis involved familiarisation with, and comparison of the studies. Interrogation of the extracted data was conducted for each of the research questions. A narrative synthesis was developed to examine relevant themes, identifying patterns and anomalies across the studies.

## 2.10. Risk of bias across studies

The risk of bias was considered across all studies, and results were examined for missing data.

# 3. Results

Forty seven studies were included in the final review (Table 1). The study flow diagram is provided below (see Fig. 1).

Emerging themes were categorised into four key domains: considering the decision, discussing the decision, implementing the decision and the consequences of DNACPR orders. Each domain was synthesised into sub categories.

## 3.1. Considering the decision

The evidence here is mostly descriptive. It identifies the key decision makers involved in discussion and decisions about DNACPR orders and it illustrates the triggers and variations for that decision.

### 3.1.1. Key decision makers

Four key groups were identified: senior physicians often with direct decision-making responsibility,<sup>7–12</sup> nursing staff,<sup>10,13–17</sup> the patient,<sup>14,18,19</sup> and relatives.<sup>19–21</sup> There was discord about whether responsibility should lie with one<sup>10,12,17,21</sup> or more senior physicians or a multi-disciplinary team,<sup>10,13,22,23</sup> and the degree of authority of patients/relatives in the decision-making process.<sup>10,12,14,18–22,24</sup> Nursing staff played a key role in initiating<sup>10,13–17</sup> or following up<sup>25</sup> discussions about DNACPR. Family, particularly adult children as surrogate decision makers, often aided decision-making.<sup>18,26,27</sup>

### 3.1.2. Triggers for consideration of DNACPR

Several hospital studies showed a considerable variation across specialities and wards.<sup>22,28</sup> These spanned acute admission,<sup>7,19,27,29–31</sup> when death was anticipated within hours to days<sup>11,26,27</sup> and/or a sudden deterioration that triggered a resuscitation or critical care team assessment.<sup>32–36</sup> With planned

admissions and long term care, DNACPR orders were considered generally as part of an overall treatment plan.<sup>22,28,37</sup>

Across the studies, the following factors influenced decision-making. Older age was contributory in 11 studies,<sup>7,9,11,18,20,26,28,32,35,38,39</sup> one of which identified a change over time with the improvements in CPR<sup>24</sup>; co-morbidities such as advanced cancer, heart failure, chronic obstructive pulmonary disease, and cognitive deterioration<sup>11,18–21,38,40,41</sup>; adverse prognostic factors e.g. lack of bystander CPR<sup>32</sup>; general clinical condition during the current admission e.g. from previous successful resuscitation or an admission to intensive care<sup>9,18,20</sup>; an indication of the patient's quality of life preceding or after previous resuscitation,<sup>18,21,37</sup> including harmful consequences,<sup>42</sup> and an assessment of the likelihood of success this time.<sup>21,35,42</sup>

Cultural factors such as race/ethnicity,<sup>26,38</sup> marital status<sup>27</sup> and having received pastoral services<sup>26</sup> were also influential.

## 3.2. Discussing the decision

These studies were mainly qualitative or observational. A few assessed interventions to improve the quality, frequency, variability and nature of discussions; others identified barriers and facilitators to good communication.

### 3.2.1. Its variability

Consensual decision-making included patient views, medical expertise and a team approach,<sup>14</sup> but involvement of the patient varied from 25%<sup>42</sup> to 70%<sup>43</sup> to 82%.<sup>44</sup> Time for discussion ranged from a median of 1 min<sup>40</sup> to 10 min.<sup>30</sup>

### 3.2.2. Its nature

Some conversations took a general rather than patient-specific approach<sup>31,40</sup> or were impartial in the way they presented the decision.<sup>31</sup> Physicians often allowed insufficient time for patients to express, discuss<sup>40</sup> or follow up their views, or questions in person.<sup>25</sup>

### 3.2.3. Those involved

Relatives were frequently consulted,<sup>11,21,43</sup> often as proxy for patients who lacked cognitive capacity<sup>37</sup> or could not communicate.<sup>10,21</sup> However, exclusion of the patient was not always justified.<sup>45</sup> One Belgian intervention, designed specifically to increase family involvement, reported an improvement in documentation by physicians about who participated in decision-making and the rationale behind the decision.<sup>16</sup>

### 3.2.4. Patient understanding of CPR and prognosis

Information is required for patients and families<sup>17,40</sup> to gain a realistic understanding of the choices to be made, but information about prognosis, and likelihood of survival beyond CPR varied across disciplines.<sup>40</sup> Patients sometimes lack understanding of CPR and its success rate<sup>42</sup> and of the decision to which they are being asked to contribute.<sup>46</sup> This misunderstanding is concerning to physicians<sup>31,47</sup> although they may compound the problem by failing to clarify the unpredictability of CPR<sup>19,31,40</sup> or by using unintelligible medical jargon.<sup>19,31,40</sup> Patients were reported as focusing on life-sustaining therapies rather than long term goals.<sup>40</sup>

### 3.2.5. Conflicting views

Conflict was reported more commonly where patient autonomy was said to be a priority<sup>31,47</sup> or when there was a cultural interpretation (in Hong Kong) that DNACPR was equivalent to euthanasia.<sup>25</sup> Conflicts could be resolved through good communication<sup>36</sup> or by

**Table 1**  
Review studies.

| Authors                                      | Quality of study | Country       | Purpose of study   | Study design  | Setting  | Participants   | Data collected         | Response   |
|--|------------------|---------------|--|---|--|--|------------------------|--|
| Abby (2012) <sup>23</sup>                    | Low              | Hong Kong     | Perceptions of DNACPR order  | Cross sectional questionnaire   | One hospital   | 16 physicians<br>33 nurses<br>25 patients<br>27 relatives  | 3–10/08/09             | 101/unknown number of participants   |
| Anderson et al. (2010) <sup>38</sup>         | Low              | USA           | Do physicians' DNACPR/CPR discussions meet recommendations?  | Cross sectional observational study; Questionnaires   | Two university hospitals   | 32 physicians<br>80 patients   | August 2008–March 2009 | 32/35 physicians<br>80/171 patients  |
| Bailey et al. (2012) <sup>24</sup>           | Medium           | USA           | To ascertain DNACPR practice, timing of orders   | Prospective Chart abstraction   | Six Veteran's Affairs (VA) Medical Centres                         | 1069 records of deceased veterans  | 2005                   | NA   |
| Beccera et al. (2011) <sup>18</sup>          | Low              | Switzerland   | To determine the prevalence of DNACPR/CPR orders; associated factors; how decisions are made and documented                        | Prospective review of DNACPR/CPR orders. Retrospective face-face survey of physicians                     | The medical wards of a large tertiary university teaching hospital | 1446 patient records were assessed but 206 (106 were DNACPR orders) presented in detail. 85% (total $n=61$ ) of all residents involved in patient care | April 2004–May 2005    | 1446 records examined; Total of 61 different physicians were involved  |
| Brizzi et al. (2012) <sup>5</sup>            | Low              | Sweden        | Frequency and predictive factors for DNACPR orders and association to prognosis  | Medical record review; Computed tomography scans  | One hospital   | 197 ICH patients   | January 2007–June 2009 | 197/203 patients   |
| Butler et al. (2006) <sup>6</sup>            | Low              | RoI           | How DNACPR orders are made in practice   | Cross sectional survey  | 38 general hospitals with acute admission facilities               | 173 consultant physicians  | 01/04/2003             | 173/298 (57%)  |
| Chakraborty and Creaney (2006) <sup>35</sup> | Medium           | UK – Scotland | Reasons contributing to DNACPR orders in psychiatric patients  | Audit; Nurses were asked for missing data for the audit   | Psychiatric Wards of Ayrshire and Arran                            | 35 DNR orders for elderly patients   | July and Sept 2004     | NA   |
| Chang et al. (2010) <sup>25</sup>            | Low              | Taiwan        | To compare differences in care for those with a DNACPR order; to determine clinical factors which influence DNACPR decision making | Prospective data collection   | ICUs in two Taipei area hospitals                                  | 202 patients   | Not given              | NA   |
| Cohn et al. (2013) <sup>47</sup>             | Med              | UK – England  | To determine the influence of a DNACPR order on the care of patients   | Primarily direct observation; Semi-structured interviews; 3 month 'notes review' of nominal 100 decisions | Two acute wards in a typical middle sized NHS hospital             | 13 doctors; 14 nursing staff; Two patient interviews; 103 DNACPR decisions/581 admissions.   | 2010 – 6 months        | Not given  |
| Deep et al. (2007) <sup>45</sup>             | High             | USA           | How do physicians approach DNACPR/CPR discussions; what do they find most challenging?   | Survey  | Teaching hospital  | 55 resident physicians   | 01/09/2005             | 55/82 Resident physicians in PGY years 1–4 (67%); rotating on inpatient internal medicine services internal medicine and medicine paediatrics                      |
| Deep et al. (2008a) <sup>29</sup>            | High             | USA           | How do discussions occur and what factors influence physicians' communicative practice?  | Qualitative semi-structured interviews  | Two medical centres served by one training programme               | 28 resident physicians; 28 patients; 12 surrogates   | Not given              | 80/82 resident physicians were eligible to identify a patient or surrogate decision maker with whom they had discussed resuscitation within the preceding 36 hours |

Table 1 (Continued)

| Authors                                    | Quality of study | Country           | Purpose of study  | Study design  | Setting  | Participants   | Data collected  | Response  |
|--|------------------|-------------------|---|---|--|--|---|---|
| Deep et al. (2008b) <sup>44</sup>          | High             | USA – Kentucky    | How discussions around DNACPR/CPR are interpreted by patients and relatives, and physicians   | Semi-structured interviews after consultation about CPR   | Two medical centres served by one training programme | 28 resident physicians; 28 patients;   | May–October 2006  | As above  |
| De Keyser Ganz et al. (2012) <sup>11</sup> | High             | Israel: Jerusalem | To explore the reasons nurses do not initiate CPR in cases they consider futile   | Questionnaire survey  | Five adult internal medicine wards in two hospitals  | 122 nurses   | Not given   | 122/142 questionnaires distributed                                      |
| Dobos et al. (2005) <sup>16</sup>          | Low              | Germany           | To determine if bioethical principles are linked to the education of doctors and to compare results with another study (see Elo)  | Cross sectional questionnaire   | Two medical centres in Hungary and Germany           | 36 doctors in Ulm  | 2003  | None given  |
| Duchateau et al. (2008) <sup>30</sup>      | Low              | France            | Factors contributing to refraining from CPR in a prehospital setting.   | Prospective, descriptive study  | Physician-staffed emergency medical service          | Emergency medical technicians' (EMTs) staffed ambulances; Physician-staffed emergency medical service. 227 patients  | 12 month period (no dates given)  | 227 patients – 114 in R group and 113 in NR group                       |
| Elo et al. (2005) <sup>7</sup>             | Low              | Hungary           | To recognise the ethical factors limiting resuscitation in Hungary (rules vs everyday practice)   | Face to face cross sectional survey   | ICUs in Hungary                                      | 72 doctors   | 2003  | 100% response rate  |
| Fritz et al. (2010) <sup>42</sup>          | High             | UK – England      | Doctors' and nurses' perceptions of care received by patients with a DNACPR order   | Anonymous questionnaire; One for physicians; One for nurses.  | One hospital   | 50 doctors in General Medicine; 25 ward nurses from General Medicine; 10 ward nurses from Care of the Elderly wards; 5 did not identify which area they worked in                    | Over the course of 2 weeks.   | 50/50 physicians; 35/40 nurses  |
| Fritz et al. (2013) <sup>27</sup>          | Med              | UK – England      | To develop a new version of the DNACPR order; to assess its impact on patient care; to compare its use against the DNACPR form used before the intervention (UFTO form) | Face-to-face semi-structured interviews; Direct observation; Field-notes; Medical records Case studies Modified early warning score (MEWS) on admission and Charlson co-morbidity scores; The Institute for Healthcare Improvement Global Trigger Tool A mixed methods before and after study with contemporaneous case controls. | 480 bed acute hospital on two wards                  | N = 47 consultants, nurses, junior doctors; 247 patients (for DNACPR) records; 26 (for palliative or optimal supportive care within 72 hours of admission); 168 case control studies | May–July 2010 on DNACPR practice and Nov 2010–Jan 2011 on UFTO practice (after month long education period) | All consultants and a purposive selection of nurses and junior doctors" |

Table 1 (Continued)

| Authors                                       | Quality of study | Country           | Purpose of study   | Study design  | Setting   | Participants  | Data collected  | Response  |
|---|------------------|-------------------|--|---|---|---|---|---|
| Giles and Moule (2004) <sup>20</sup>          | High             | UK – England      | Nurses' attitudes, experiences, and factors contributing to DNACPR decision making   | questionnaire   | One hospital – eleven ward areas including critical care, general medical and surgical ward   | 78 registered nurses  | Not given   | 78/120 were fully completed questionnaires  |
| Grudzen et al. (2010) <sup>32</sup>           | Low              | USA – Los Angeles | Following introduction of a new policy – to determine the rate of change in foregoing resuscitation attempts by paramedics                       | Described as observational but is a records study – quasi experimental – before and after study | Pre-hospital  | 1656 patients who experienced a cardiac arrest: 897 before and 759 after the policy change.   | As above  | NA  |
| Grudzen et al. (2009) <sup>31</sup>           | Low              | USA – Los Angeles | Following introduction of a new policy–paramedics and EMT perspectives and decision making afterwards  | Focus groups, survey, field notes (in first session)  | Geographically diverse group of large (more than 4 fire stations in their catchment area) and small EMS agencies (with four or fewer fire stations) | 36 Paramedics or EMT  | First 7 days of the months August 2006–January 2007 (pre-policy). First 7 days of each month from January–June 2008 (post policy) | NA  |
| Hilden et al. (2004) <sup>8</sup>             | Low              | Finland           | To compare nurses' experiences and views with doctors' views on end of life discussions  | Postal questionnaire  | At random from the registers of the Finnish Nurses Association and the Finnish Union of Practical Nurses  | 51% (no numbers given) so approx. 408   | Not given   | 800 nurses were approached (501 hospital and 299 practical nurses); 51% response rate   |
| Holland et al. (2013) <sup>40</sup>           | Low              | UK – England      | To determine current clinical practice for patient involvement in resuscitation decisions; to explore perceived barriers                         | Questionnaire – specifically designed, not validated  | Two hospitals; GPs at UEA-affiliated teaching practices   | Hospital clinicians: 9 male and 3 female; GPs – 7 male and 6 female   | Not given   | 47/49 was eligible to receive the questionnaire (two were investigators). 51% response rate   |
| Hurst et al. (2013) <sup>17</sup>             | Low              | Switzerland       | Physicians' justification for DNACPR orders; decisions regarding patient inclusion; how they initiated discussions                               | Face to face questionnaire with physicians on an ad hoc basis;<br><br>Patient records           | Six wards of the General Internal Medicine Dept of the Geneva University Hospitals  | No numbers of physicians are given (those who were in their offices at data collection times to a maximum of 61 resident physicians); 106/1446 patient cases after screening for CPR/DNAR orders in the study period. | April 2004–May 2005   | 61 resident physicians who were involved in decision making in this study. 98% ( $n=57?$ ) participated; ( $n=3$ ) refusal time constraints; ( $n=1$ ) insufficient number of questions were answered |
| Imhof et al. (2011) <sup>12</sup>             | High             | Switzerland       | To describe the involvement of physicians and nurses in DNACPR/CPR decision making; analyse decision patterns; understand practical implications | 'Grounded theory' interviews  | Acute care settings of 7 different hospitals  | 92 comprising of 52 nurses and 40 doctors   | Not stated  | Informal recruitment session explaining the study to potential participants. Volunteers were then telephoned to arrange an interview session.   |
| Janssen van Doorn et al. (2008) <sup>21</sup> | Low              | Belgium           | To examine the process, consequences and impact of writing DNACPR orders particularly withholding renal replacement therapy                      | Prospective review of All DNR orders  | Department of Intensive Care,   | 43 patients)  | 3 month period  | 43 patients with DNRs/310 admitted to ICU)  |



Table 1 (Continued)

| Authors                                    | Quality of study | Country           | Purpose of study   | Study design   | Setting   | Participants   | Data collected  | Response   |
|--|------------------|-------------------|--|--|---|--|---|--|
| Jepson (2003) <sup>13</sup>                | Low              | UK – Wales        | To examine the roles of hospital and practice nurses in DNACPR decision making   | Described as an audit but included a questionnaire and semi structured interview designed for hospital and community nurses. | Hospital and community nursing  | 45 practice nurses working in the 'same area'; 49 acute hospital nurses  | Not given   | Total population of 86 practice nurses for the postal questionnaire, and interviews with 49 nurses chosen by quota sampling, they were 'recruited' in hospital<br>NA |
| Kim et al. (2007) <sup>43</sup>            | Med              | Republic of Korea | To examine current practices relating to DNACPR orders for terminal patients with cancer   | Retrospective medical chart review   | 4 major teaching hospitals in urban areas of Korea  | 387 patients   | A mean of 62% of patient deaths resulting from cancer that occurred in each of the four hospitals between 01/01 and 31/12/05<br>1989 and 2003 | 1989: 81/110 (74%)<br>2003: 110/112 (98%)  |
| McAdam et al. (2005) <sup>22</sup>         | Low              | UK – England      | To ascertain any change in nurses' attitudes towards DNACPR orders between 1989 and 2003   | Questionnaire  | 2 hospitals of a district general hospital complex in 1989; acute medical wards or in A&E (not ICU), and the same hospital trust in 2003; acute general medicine (no mention of ICU or A&E) | 1989–1981 nurses practising in acute medical wards or in A&E (not ICU); 2003 – 110 nurses practising in acute general medicine in the same Trust.  | January 2007–February 2009  | 113/9587 patients who were admitted to the unit and 198 died. 113/198 (57%) died where CPR was ruled out. 1281 patient records analyzed                              |
| Martinez-Selles et al. (2010) <sup>9</sup> | Low              | Spain             | To evaluate the use of DNACPR orders and palliative care in cardiac patients   | Retrospective data collection from registry of deaths  | Cardiology dept of a tertiary hospital  | 113 medical records  | January 2007–February 2009  | 113/9587 patients who were admitted to the unit and 198 died. 113/198 (57%) died where CPR was ruled out. 1281 patient records analyzed                              |
| Meilink et al. (2006) <sup>26</sup>        | Med              | The Netherlands   | To improve documentation of DNACPR orders in medical records by introducing a patient information sheet  | Retrospective chart review   | Isala Clinics, a tertiary hospital  | 119/1281 records with a DNAR order on the admission form (9.3%); 83 of these orders were positive resuscitation orders and 36 were DNAR decisions. | February 2005   | 277 in hospital deaths from cardiac arrest with MET intervention   |
| Mendes et al. (2009) <sup>33</sup>         | Low              | Portugal          | To identify factors associated with DNACPR orders in patients who suffer cardiac arrest  | Retrospective data collection from recorded MET calls  | Hospital  | 277 in hospital deaths from cardiac arrest with MET intervention   | January 2002 – August 2006  | NA   |
| Messinger-Rapport (2005) <sup>36</sup>     | Low              | USA               | To determine prevalence and predictors of DNACPR orders in nursing home  | X sectional chart review study   | 899 bed academic long term care facility  | 177 patient records but the code status could not be ascertained from 15 of the records so these were excluded.                                    | Not given   | 177 patient records. A DNR order was noted in 40% (n = 65) of the patient records  |
| Micallef et al. (2011) <sup>39</sup>       | High             | Australia         | To assess level of agreement on DNACPR/CPR orders between intensive care doctors, specialist physicians and surgeons; barriers to documenting decisions during MET calls | 11 month prospective single-centre observational study   | 650 bed tertiary referral university teaching hospital  | 129 patients referred to the MET (Medical Emergency Team) between July 1st 2009–May 30th 2010; patients who had in-hospital cardiac arrests        | July 2009–June 2010   | NA   |

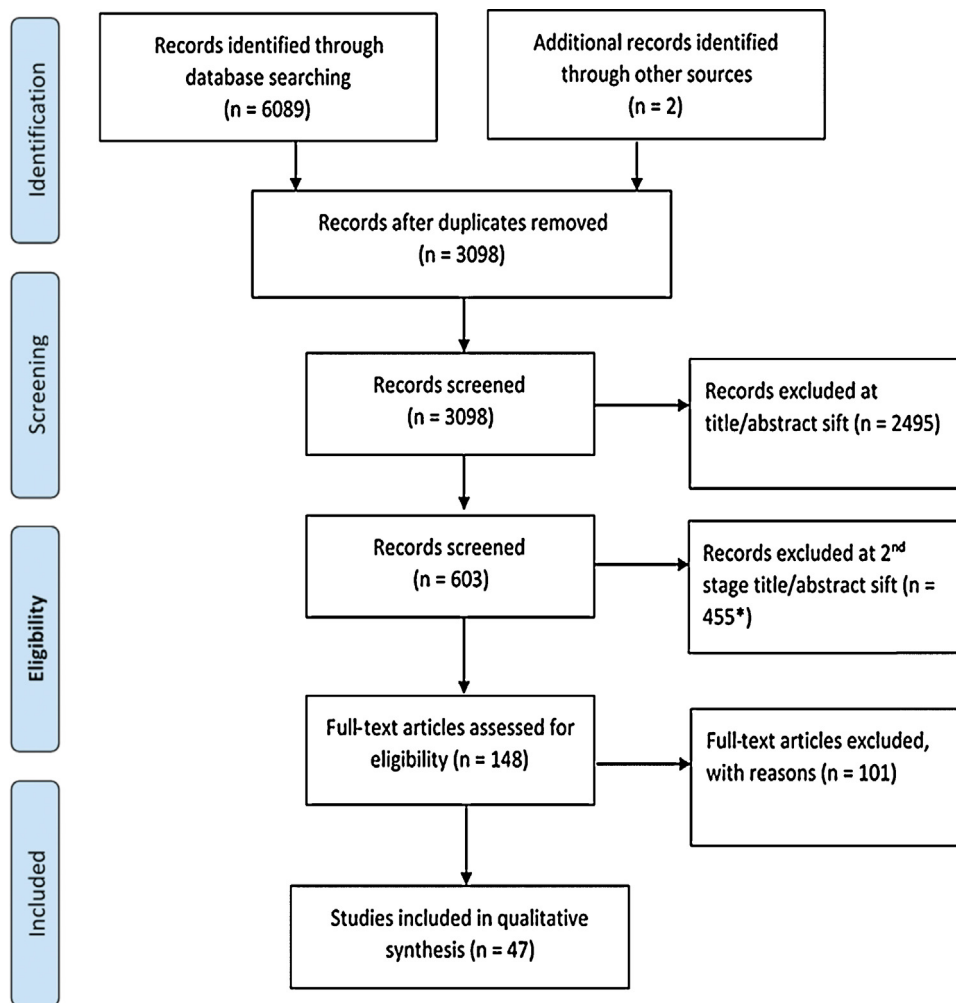
Table 1 (Continued)

| Authors                                     | Quality of study | Country       | Purpose of study  | Study design   | Setting   | Participants   | Data collected   | Response   |
|---|------------------|---------------|---|--|---|--|--|--|
| Myint et al. (2006) <sup>19</sup>           | High             | UK – England  | Experience, practice and opinions of SpRs in geriatric medicine regarding DNACPR decisions  | X sectional postal questionnaire.  | Multiple settings trainee members of the British Geriatrics Society   | 235 Specialist Registrars  | November 2003  | Response rate was 62% (251/408). Of these, 16 were no longer SpR grade: 235/251 (94% of 251).  |
| Myint et al. (2010) <sup>37</sup>           | High             | UK – England  | To examine the personal experiences of SpRs in geriatric medicine and DNACPR decision making  | Postal Questionnaire Survey  | Multiple settings trainee members of the British Geriatrics Society   | 198 responses included   | November 2003  | 251/408 responded. 16 were not SpR grade; 37 did not question 4c – 198/408   |
| Naess 2009 <sup>41</sup>                    | High             | Norway        | Attitudes and experiences of nurses in ICCUs  | X sectional questionnaire – web based.                                     | Intensive coronary care units (ICCU) in 5 hospitals (1 for each health care region)   | 176 nurses completed the questionnaire   | Not stated   | 176/295 nurses completed the questionnaire   |
| Nordby and Nohr (2012) <sup>34</sup>        | Med              | Norway        | How paramedics experience difficult ethical dilemmas regarding DNACPR/CPR of cancer patients  | Semi-structured interviews   | National ambulance services   | 15 paramedics  | The larger research project of which this study is a part, was 'initiated' in the autumn of 2009.                                    | More than 100 phone calls and e-mails were received from paramedics who wanted to participate – possibly for the larger project.   |
| Park et al. (2011) <sup>59</sup>            | Low              | South Korea   | To determine the perceptions and attitudes of nurses towards DNACPR; changes in their nursing activities after the order is decided           | Questionnaire  | 6 University general hospitals  | 252/300 ICU nurses after exclusions  | August–October 2008  | Convenience Sample of 50 nurses at each of the 6 hospitals   |
| Piers et al. (2011) <sup>14</sup>           | Med              | Belgium       | Introduction of a new DNACPR form: with emphasis on motivation of the decision and description of participants in the decision making process | Audit pre and post intervention; Questionnaires sent to doctors and nurses | 1062 bed tertiary hospital in Ghent   | 330 patient deaths, 228 included, 115 pre-intervention, 113 post-intervention  | 12 weeks in 2007 and 16 weeks in 2008  | 40% (338/792) nurses and 60% (237/392) doctors attended the briefing on the intervention. However it is unknown how many participated in the study questionnaires                        |
| Saevareid and Balandin (2011) <sup>15</sup> | Med              | Norway        | Nurses' perspectives about DNACPR/CPR in the oldest old   | Semi-structured, in-depth interviews.                                      | 3 Hospitals – acute geriatric, cardiology, surgical rheumatology, lung and infection wards, intensive care unit and an anaesthesia department | Nine female and one male nurse agreed to participate   | Between March 2009 and January 2010  | Heads of hospital wards agreed to recruit staffs who were Registered Nurses who had nursed at least one patient aged 85 years or older in the last 2 years – no further details given NA |
| Schiebel et al. (2013) <sup>50</sup>        | High             | USA Minnesota | Introduction of armbands to indicate resuscitation status   | 1. Electronic audit; 2. Observation; 3. Pre and post intervention audits   | Academic, tertiary care hospital with 2059 beds.  | Phase 1: First 50/210 charts with DNACPR orders; Phase 2: 5775 orders for 4288 patients of which 1162 were DNACPR orders; Phase 3: 316 active DNACPR orders pre intervention and 199 post intervention | Phase 1: (10/2006–07/2007) Phase 2: (03/2007–08/2008; final audit 10–11/2008). Phase 3: (11/2008–02/2009) Phase 4: (01/2009–07/2009) |  |



Table 1 (Continued)

| Authors                                  | Quality of study | Country        | Purpose of study  | Study design   | Setting   | Participants  | Data collected   | Response   |
|--|------------------|----------------|---|--|---|---|--|--|
| Siddiqui and Holley (2011) <sup>28</sup> | Low              | USA – Illinois | To analyze internal medicine resident physicians' training and comfort in discussing DNACPR and pronouncing death   | Online survey  | 18 internal medical residency programmes  | 176 (22%) residents in training   | 12/2008  | Invitation e-mail to residency programme directors who agreed to circulate the on-line survey to their trainees: Resident physicians in PGY years 1–4.         |
| Smith et al. (2005) <sup>48</sup>        | Low              | UK – England   | To determine the level of knowledge about the hospital's DNACPR policy amongst a range of staff   | Cross sectional questionnaire by email and internal mail   | UK district general hospital  | 677: Nurses, healthcare support workers ( <i>n</i> = 396); Doctors ( <i>n</i> = 37); Admin and support staff <i>N</i> = 244   | July 2003 by email; August 2003 hospital internal mail   | unknown how many were sent emails or internal mail but approx 2000   |
| Sulmasy et al. (2006) <sup>46</sup>      | Med              | USA New York   | DNACPR consent form transformed into an order form with witness verbal consent. To assess house officers' attitudes and confidence obtaining informed consent; if process improved; decrease in surrogate stress levels | Intervention and control hospitals Mixed methods before and after study: Questionnaire; Chart review. Validated instrument | Two hospitals   | House Officer: <i>n</i> = 277 Physician and Nursing Attitudes: not reported; Patient charts <i>n</i> = 429 (269 intervention hospital <i>n</i> = 269 and comparison hospital <i>n</i> = 160) Surrogate stress: <i>n</i> = 120 | May and Aug 2002, and Jan– June 2004; 3 mailings: September 2003, January 2004, and February 2004. | Intervention arm – 83/107 (78%) pre intervention; 97/115 (84%) post intervention. Comparison arm – 49/51 (96%) pre intervention; 48/53 (91%) post intervention |
| Yang et al. (2012) <sup>10</sup>         | Med              | Singapore      | To determine the views of oncology and palliative care doctors and nurses on DNACPR orders  | Questionnaire survey   | A tertiary specialist cancer centre and an inpatient oncology ward located within the same campus | 37 doctors and 109 nurses   | 1 month period March 2011  | 146/187 questionnaires were returned (response rate of 78.1%)  |
| Zhukovsky et al. (2009) <sup>49</sup>    | High             | USA            | A descriptive study to inform revisions of the current inpatient DNACPR form  | Survey by mail   | National Cancer Institute-designated cancer centres   | 60% of institutions participated – 30 DNACPR forms  | 2002–2003 (12 week period)   | 31/50 sites that provided inpatient care: 60% response rate.   |



**Fig. 1.** PRISMA 2009 Flow Diagram: DNACPR Systematic Review. \*146 of the 455 were considered to be of borderline interest. Characteristics of these articles did not include for example, data on the DNACPR process or were too broad (e.g. about end of life care and CPR). A list is available from the authors on request.

Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(6): e1000097. doi:10.1371/journal.pmed1000097

requesting a second opinion.<sup>8</sup> Holland et al.<sup>42</sup> reported a participant's response that it would take away 'hope' further pushing the patient into decline and that it was 'kinder' to only involve patients if there was an expected positive outcome to CPR. Detailed explanation by the physician can change patients' understanding and preferences<sup>31</sup> in one study three out of four patients changed their minds (from not wanting CPR, to wanting CPR) after discussion with their physician.<sup>40</sup>

### 3.2.6. Barriers to discussions

Physicians may underestimate the numbers of patients who want to discuss DNACPR status.<sup>19</sup> One study found that patients thought it was acceptable to be involved in DNACPR discussions.<sup>25</sup>

Patient focussed reasons for omitting discussion were: a perceived resistance from the patient to discuss DNACPR orders<sup>8,19</sup>; a desire not to cause anxiety or distress<sup>19,22,42</sup> and poor health status.<sup>8</sup>

Physician barriers included: feeling unskilled or inadequately trained<sup>30,42,46,47</sup>; having low confidence<sup>48</sup>; inexperience; discomfort<sup>20,21</sup> or embarrassment<sup>19</sup>; fear of complaints<sup>21</sup>; and difficulty in coming to a decision themselves.<sup>20</sup> Avoiding the responsibility of decision-making altogether<sup>49</sup> was also admitted. Nurses believed that fear of harming the patient<sup>17</sup> and lack of

courage to withdraw treatment due to medical uncertainty<sup>10</sup> were also factors.

One study found that there was only a small number of cases where the family was not involved.<sup>11</sup> The proportion of families consulted increased ( $n=34/78$ , 44% to  $n=46/73$ , 63%) in one Belgian study after the introduction of a new DNACPR form.<sup>16</sup> Families, often unaware of the terminal care diagnosis, could demand excessive care, insist on intensive care and act aggressively towards staff.<sup>10</sup> In some cases, it was reported that relatives could become physically or verbally aggressive and threaten legal action particularly where the patient had requested DNACPR. Attempts to overrule the patient's wishes were sometimes successful.<sup>39</sup>

### 3.2.7. Preference to discuss CPR rather than DNACPR

CPR was more readily discussed with patients than DNACPR as illustrated by one Swiss study's<sup>19</sup> findings that resident physicians initiated more discussions for CPR than DNACPR (83%, 68% respectively) but that patients initiated more discussions for DNACPR than CPR (16%, 8%). Conversely, the discussion was sometimes framed in such a way that the patient did not request CPR.<sup>31</sup>

### 3.2.8. Facilitators to discussions

Treating CPR/DNACPR discussions in context as part of overall treatment decisions<sup>19,31</sup> or presenting them as a routine discussion,<sup>20,29</sup> providing the patient was able to communicate and be involved in the decision-making process,<sup>10,43</sup> was helpful to doctors. Training can influence physicians' sensitivity to patients' autonomy in decision-making.<sup>9</sup>

Nurses felt they were responsible for physical and emotional support of the patients and found discussing DNACPR decisions rewarding.<sup>10</sup>

### 3.3. Implementing the decision

#### 3.3.1. Guidelines, law or local policies

Countries approaches to DNACPR varied from having national guidelines, local policies to having no formal system or policy structure at all. Where formal documents existed, healthcare professionals' knowledge about their existence and content varied.<sup>8,15,21,43,50</sup> Opinions on their utility ranged from 'helpful in day-to-day practice', to disagreement with their content<sup>21</sup> leading to poor implementation.<sup>14</sup>

#### 3.3.2. Communicating the decision to the wider health team

Highly visible documentation or symbols are commonly used to alert staff to DNACPR status and are recorded in the patient's medical notes.<sup>37,49</sup> In addition, the content of pre-printed DNACPR order forms varied widely.

#### 3.3.3. Breakdown in communication

**3.3.3.1. Missing, incorrect or incomplete documentation.** Reasons given for non-documentation of patient discussions included lack of capacity, potential distress, time pressure, or the patient not wanting to discuss the topic.<sup>49</sup> Decision-making together with patients and/or their relatives was variously documented in the evidence. Most decisions were documented as having been discussed with relatives, particularly when the patient was comatose.<sup>27,37</sup> Others reported that just a few discussions were documented.<sup>28,49</sup> Cohn et al. (2013)<sup>49</sup> quoted one junior doctor's attitude towards completing DNACPR documentation in an acute hospital: *'I think in some ways the piece of paper at the end of it isn't as important, because it's more about thinking how much you're going to treat this patient in general'*.

Systems for communicating DNACPR decisions ranged widely and included: explicit entry in the patient's medical<sup>37,49</sup> or nursing notes,<sup>11,22,37,49</sup> and clarified at staff handover<sup>22</sup>; specific DNACPR forms<sup>16,19,20,23,28,29,45,48,51</sup>; or icons such as red heart or other symbol noted in case records<sup>10</sup>; armbands<sup>52</sup>; a black circle written on a whiteboard or an encircled R recorded on an electronic record<sup>49</sup> or 'resus minus' (R-minus) recorded in the patients' records.<sup>36</sup> The colours used to depict DNACPR status included red and black,<sup>49</sup> orange<sup>23</sup> and blue.<sup>37</sup>

Some decisions were implemented as part of an overall treatment plan that covered other relevant aspects of care such as whether to admit to intensive care and artificial nutrition and hydration.<sup>16,19,20,23,44,51</sup> One English study<sup>29</sup> focused on treatments to be given rather than withdrawn and makes a distinction between when the goal of care is comfort or cure.

Rationale for a DNACPR decision was inconsistently recorded and often poor.<sup>28,37</sup> Forty per cent of decisions in one study<sup>37</sup> were simply recorded as an 'advanced state of illness which contributed to a poor quality of life and made the success of CPR unlikely'. Phrases such as 'futility', 'frailty' or 'comorbidities'<sup>49</sup> and 'quality of life'<sup>37</sup> were used with no further explanation.

Incomplete or discrepant documentation had devastating results for the patients ranging from an undignified death where

CPR was clearly futile, or failure to initiate CPR where it had a chance of saving the patient.<sup>46,49</sup>

### 3.4. Consequences of a DNACPR decision

There was often confusion about the impact that a DNACPR decision had on other aspects of care.<sup>10,27,44</sup> Examples included less invasive medical treatments,<sup>27</sup> and reduced escalation to medical and outreach staff,<sup>44</sup> fewer nursing observations,<sup>10,44</sup> less basic care, including pain relief, and altered fluid intake.<sup>10,44</sup> Such concerns about this negative impact of DNACPR decisions<sup>25,39,49</sup> sometimes impeded willingness to place a DNACPR.<sup>39,49</sup>

## 4. Quality assessment

The CASP<sup>6</sup> quality assessment tool for qualitative research was used as a guide to appraise each of the studies. The format of the CASP<sup>6</sup> tool was adapted for use across a range of different study types e.g. 'is a qualitative methodology appropriate?' was changed to 'Is the methodology appropriate to the study?' This allowed for a broad, common comparison to be made across all studies including qualitative and questionnaire methods. Half of the studies in the review were perceived to be of low quality i.e. of little value or not generalisable to a wider community. Many of the studies were cross sectional i.e. measuring one time point, some had small numbers of participants. Studies commonly utilised self-reported non-validated questionnaires which were not generally piloted for face and content validity.

## 5. Discussion

This review of the international literature identified significant variability in DNACPR decision-making and implementation. These differences include who is ultimately responsible for the decision-making; how and where the decision is made, its communication, and how and by whom the DNACPR order is implemented. Examples of good practice were identified, but overall the studies did not provide a robust evidence base. There is little indication of the cost and resources involved in resuscitating patients who might have benefitted more by being spared attempts at CPR.

The relationship between the cultures in which studies have been done, clinicians' decisions, and their underlying values are both evident and influential: in particular clinicians are grappling with how to balance a respect for autonomy with their duties to provide medical benefit and avoid harm. To expect identical approaches and processes across settings and countries is unrealistic, but to have discovered similar problems and themes is enlightening.

### 5.1. Considering and discussing the decision

Factors such as a whole team approach (including the patient if able or their family),<sup>14</sup> early and reviewable decision-making,<sup>19,20,29,31</sup> and the use of commonly understood language<sup>19,40,46</sup> will improve patient and clinician experience of this difficult topic. While this may appear to be self-evident, examples of such good practice were scant. Logistical factors such as time pressure and suitable environments<sup>30,40</sup> limited both decision-making and discussions. Initiating discussions before patients become acutely unwell, for example in primary care, has a precedent with POLST (Physician orders for life-sustaining treatment) in the US<sup>53</sup> but there do not seem to be many examples of this in Europe. Although primary care offers the potential for more considered decision-making with a greater consultation period, there is the philosophical problem of how much an

individual can predict their future wishes.<sup>49</sup> When well, a patient may not think they wish any intensive or invasive treatments; when faced with the stark reality of death they may reconsider. Balancing these extremes is important and empowering people to initiate such discussion themselves will help. Part of the problem with discussing resuscitation decisions is that, unlike consenting for a surgical procedure, where surgeons are explaining the details and risks of what they *will* do it is the decision *not* to attempt CPR which is most frequently discussed. However, clinicians should not be forced to undertake an intervention that they consider to be harmful or futile. Conflicts can therefore arise when CPR is not considered medically appropriate but the patient/family believes it is a matter of choice not just to refuse, but also to demand. Holland et al.<sup>42</sup> highlights this and exposes the ethical confusion experienced by general practitioners and hospital clinicians in the United Kingdom. There was a preference to discuss CPR, encouraging hope, to avoid upsetting the patient or to avoid a difficult conversation.<sup>19,22,42</sup>

Conversations about consent to treatment are not the same as those that explain the reasons why something is not being done. It may be helpful to include CPR decisions as part of overall care.<sup>29,53,54</sup> Specialist training in clinical reasoning, ethics and communication<sup>19–21,30,31,42,47</sup> are every bit as important as technical knowledge; without these technical skill can be a liability.

### 5.2. Implementing DNACPR and the consequences of the decision

While local and national policy created consistency,<sup>1</sup> and complete and immediately available documentation-aided communication (and therefore implementation) about DNACPR decisions there continue to be significant problems with heterogeneity of documentation. Both hospital and community staff were often unsure of what to do with a patient experiencing a cardiorespiratory arrest and their decisions usually defaulted to CPR. The need for documentation which is recognised across health settings was clear.

There were often variations in the treatment and care of people with a DNACPR order with some patients experiencing sub-optimal care whether consciously or unconsciously by staff.<sup>10,27,44</sup> This review accords with a substantial medical, surgical and primary health literature<sup>55–60</sup> and confirms that it remains a problem. Misunderstanding about what DNACPR means has not been sufficiently addressed with education and training; it is possible that health professionals require more exposure and training on this topic throughout their career, but there is currently a paucity of evidence to support that education on its own would help. An approach where clear overall goals of care are discussed, of which resuscitation decisions form a part, appear to reduce negative health outcomes, or harms, to patients.<sup>29</sup> However, further evaluation of the long term changes associated with such approaches are needed.

### 5.3. Methodological challenges and limitations

From a research and evaluation perspective the findings from the review raise a number of issues. Commonly used words are not explicitly defined in the studies or in daily practice, such as quality of life, futility or frailty, or terms like 'in the best interest'. There was a lack of detail of many aspects of the studies and in the process of data collection. Despite best efforts, the literature search may have failed to identify papers with important, additional insights or empirical evidence. The absence of evidence does not indicate an absence of good practice, simply inadequate reporting, a lack of valid and reliable tools to capture change, and possibly publication bias.

## 6. Conclusions

DNACPR decision-making and implementation can be complex as they are dependent on culture, context, policy, people, and resources. Resuscitation decisions affect patients, families, staff and organisations, raising a barrage of emotions and consequences. Decisions and discussions are often suboptimal, and occur too late for meaningful engagement. Variations in documentation and policies can cause misunderstandings and repetition of distressing conversations between settings; a degree of uniformity would reduce this. DNACPR orders may be misinterpreted to mean that other care should be withheld and compounds clinicians' reticence to discuss and implement DNACPR decisions where they are appropriate. Inclusion of DNACPR considerations within the overall care plan may facilitate good discussions and decisions, and reduce the negative impact of DNACPR orders on other aspects of patient care by making it clear which interventions should be made and which should not.

### Conflict of interest statement

All authors have completed the ICMJE uniform disclosure form at [http://www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf) and declare: no support from any organisation for the submitted work apart from grant funding from the National Institute of Health Research Health Service Delivery Research Programme; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

In addition, Dr. Perkins reports that he is a volunteer member of the Resuscitation Council (UK) who co-authored the UK Joint Statement on DNACPR decisions.

Dr. Fritz reports and that she was an author on several of the papers reviewed by the group, although she took no part in reviewing papers she had been involved in, either as an author or more tangentially.

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### Appendix 1. Search strategies

#### A.1. Ovid MEDLINE(R) 1946 to July week 1 2013, searched on 12/07/2013

|    |   |      |
|----|---|------|
| 1  | Resuscitation orders/   | 3068 |
| 2  | "do not attempt resuscitation".tw.  | 123  |
| 3  | "do not attempt cardiopulmonary resuscitation".tw.                                    | 3    |
| 4  | "do not resuscitate".tw.  | 1345 |
| 5  | "not for resuscitation".tw.   | 50   |
| 6  | "resuscitation order".tw.   | 108  |
| 7  | ("cardiopulmonary resuscitation" adj2 decision*).tw.                                  | 43   |
| 8  | "CPR decision".tw.  | 39   |
| 9  | DNAR.tw.  | 103  |
| 10 | DNACPR.tw.  | 2    |
| 11 | ((DNR or NFR) and (resuscitat* or CPR)).tw.   | 699  |
| 12 | (DNR order* or DNR discussion* or NFR order* or NFR discussion*).tw.                  | 601  |
| 13 | allow natural death.tw.   | 9    |
| 14 | allow dignified death.tw.   | 0    |
| 15 | (advance care planning/or advance directives/or living wills/) and exp Resuscitation/ | 916  |

|    |   |      |
|----|---|------|
| 16 | ((advance* care plan* or patient care plan* or advance* directive* or living will*) and (resuscitat* or CPR)).tw. | 458  |
| 17 | 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16                               | 4095 |
| 18 | limit 17 to (english language and yr = "2003 – Current")  | 1616 |

#### A.2. Ovid MEDLINE(R) in-process and other non-indexed citations July 11, 2013, searched on 16/07/2013

|    |   |     |
|----|---|-----|
| 1  | "do not attempt resuscitation".tw.  | 7   |
| 2  | "do not attempt cardiopulmonary resuscitation".tw.  | 2   |
| 3  | "do not resuscitate".tw.  | 77  |
| 4  | "not for resuscitation".tw.   | 4   |
| 5  | "resuscitation order".tw.   | 10  |
| 6  | ("cardiopulmonary resuscitation" adj2 decision*).tw.  | 3   |
| 7  | "CPR decision".tw.  | 2   |
| 8  | DNAR.tw.  | 4   |
| 9  | DNACPR.tw.  | 2   |
| 10 | ((DNR or NFR) and (resuscitat* or CPR)).tw.   | 37  |
| 11 | (DNR order* or DNR discussion* or NFR order* or NFR discussion*).tw.  | 26  |
| 12 | allow natural death.tw.   | 3   |
| 13 | allow dignified death.tw.   | 0   |
| 14 | ((advance* care plan* or patient care plan* or advance* directive* or living will*) and (resuscitat* or CPR)).tw. | 19  |
| 15 | 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14   | 104 |
| 16 | limit 15 to (english language and yr = "2003 –Current")   | 81  |

#### A.3. Embase 1974 to 2013 week 28, searched on 17/07/2013

|    |   |      |
|----|---|------|
| 1  | "do not attempt resuscitation".mp.  | 192  |
| 2  | "do not attempt cardiopulmonary resuscitation".mp.  | 9    |
| 3  | "do not resuscitate".mp.  | 1730 |
| 4  | "not for resuscitation".mp.   | 69   |
| 5  | "resuscitation order".mp.   | 213  |
| 6  | ("cardiopulmonary resuscitation" adj2 decision*).mp.  | 50   |
| 7  | "CPR decision".mp.  | 46   |
| 8  | DNAR.mp.  | 172  |
| 9  | DNACPR.mp.  | 6    |
| 10 | ((DNR or NFR) and (resuscitat* or CPR)).mp.   | 1118 |
| 11 | (DNR order* or DNR discussion* or NFR order* or NFR discussion*).mp.  | 768  |
| 12 | allow natural death.mp.   | 18   |
| 13 | allow dignified death.mp.   | 0    |
| 14 | (patient care planning/or living will/or medical order/or medical documentation/) and resuscitation/              | 1243 |
| 15 | ((advance* care plan* or patient care plan* or advance* directive* or living will*) and (resuscitat* or CPR)).tw. | 577  |
| 16 | 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15                                     | 3643 |
| 17 | limit 16 to (english language and yr = "2003 –Current")   | 1827 |

n.b. The following subject headings were not in Emtree at the time of searching.  
 "do not attempt resuscitation order"/  
 "do not resuscitate order"/  
 "not for resuscitation"/  
 This type of heading is known as a candidate term (assigned by Embase indexers to articles in which concepts are not adequately covered by an existing Emtree term).  
 Searching on.mp. retrieved records with these terms.

#### A.4. CINAHL via EBSCO searched on 17/07/2013

| n.b. search reads from bottom to top |   |      |
|--------------------------------------|---|------|
| S18                                  | S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S16<br>Limiters – Published Date from: 20030101–; Language: English | 1119 |
| S17                                  | S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S16<br>S14 OR S15   | 2080 |
| S16                                  | AB ((advance* N1 care N1 plan*) OR (patient N1 care N1 plan*) OR (advance* N1 directive*) OR (living N1 will*)) AND (resuscitat* OR CPR)              | 210  |
| S15                                  | AB ((advance* N1 care N1 plan*) OR (patient N1 care N1 plan*) OR (advance* N1 directive*) OR (living N1 will*)) AND (resuscitat* OR CPR)              | 190  |
| S14                                  | TI ((advance* N1 care N1 plan*) OR (patient N1 care N1 plan*) OR (advance* N1 directive*) OR (living N1 will*)) AND (resuscitat* OR CPR)              | 29   |

|     |   |      |
|-----|---|------|
| S13 | ((MH "Advance Care Planning") OR (MH "Advance Directives") OR (MH "Living Wills")) AND ("Resuscitation Orders +")   | 376  |
| S12 | TI "allow dignified death" OR AB "allow dignified death" OR MW "allow dignified death"  | 0    |
| S11 | TI "allow natural death" OR AB "allow natural death" OR MW "allow natural death"  | 16   |
| S10 | TI ((DNR N1 order*) OR (DNR N1 discussion*) OR (NFR N1 order*) OR (NFR N1 discussion*)) OR AB ((DNR N1 order*) OR (DNR N1 discussion*) OR (NFR N1 order*) OR (NFR N1 discussion*)) OR MW ((DNR N1 order*) OR (DNR N1 discussion*) OR (NFR N1 order*) OR (NFR N1 discussion*)) | 320  |
| S9  | TI ((DNR OR NFR) AND (resuscitat* OR CPR)) OR AB ((DNR OR NFR) AND (resuscitat* OR CPR)) OR MW ((DNR OR NFR) AND (resuscitat* OR CPR))  | 311  |
| S8  | TI (DNAR OR DNACPR) OR AB (DNAR OR DNACPR) OR MW (DNAR OR DNACPR)   | 44   |
| S7  | TI CPR N1 decision* OR AB CPR N1 decision* OR MW CPR N1 decision*   | 31   |
| S6  | TI "cardiopulmonary resuscitation" N2 decision* OR AB "cardiopulmonary resuscitation" N2 decision* OR MW "cardiopulmonary resuscitation" N2 decision*   | 40   |
| S5  | TI (resuscitation N1 order*) OR AB (resuscitation N1 order*) OR MW (resuscitation N1 order*)  | 1744 |
| S4  | TI ("do not resuscitate") OR AB ("do not resuscitate") OR MW ("do not resuscitate")   | 643  |
| S3  | TI ("do not attempt cardiopulmonary resuscitation") OR AB ("do not attempt cardiopulmonary resuscitation") OR MW ("do not attempt cardiopulmonary resuscitation")   | 3    |
| S2  | TI ("do not attempt resuscitation") OR AB ("do not attempt resuscitation") OR MW ("do not attempt resuscitation")   | 55   |
| S1  | MH "Resuscitation Orders"   | 1731 |

#### A.5. Cochrane Library (all sections), searched via Wiley on 19/07/2013

|     |  |      |
|-----|--|------|
| #1  | MeSH descriptor: [Resuscitation Orders] this term only   | 16   |
| #2  | "do not attempt resuscitation":ti,kw,ab  | 2    |
| #3  | "do not attempt cardiopulmonary resuscitation":ti,kw,ab  | 0    |
| #4  | "do not resuscitate":ti,kw,ab  | 34   |
| #5  | "not for resuscitation":ti,kw,ab   | 2    |
| #6  | resuscitation next order":ti,kw,ab   | 24   |
| #7  | "cardiopulmonary resuscitation" near/2 decision":ti,kw,ab  | 4    |
| #8  | CPR near/3 decision":ti,kw,ab  | 1    |
| #9  | DNAR:ti,kw,ab  | 0    |
| #10 | DNACPR:ti,kw,ab  | 0    |
| #11 | ((DNR or NFR) and (resuscitat* or CPR)):ti,kw,ab   | 22   |
| #12 | (DNR next order* or DNR next discussion* or NFR next order* or NFR next discussion*):ti,kw,ab  | 21   |
| #13 | "allow natural death":ti,kw,ab   | 0    |
| #14 | "allow dignified death":ti,kw,ab   | 0    |
| #15 | MeSH descriptor: [Advance Care Planning] this term only  | 48   |
| #16 | MeSH descriptor: [Advance Directives] this term only   | 69   |
| #17 | MeSH descriptor: [Living Wills] this term only   | 12   |
| #18 | #15 or #16 or #17  | 111  |
| #19 | MeSH descriptor: [Resuscitation] explode all trees   | 3325 |
| #20 | #18 and #19  | 10   |
| #21 | ((advance* next care next plan* or patient next care next plan* or advance* next directive* or living next will*) and (resuscitat* or CPR)):ti,kw,ab | 35   |
| #22 | #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #20 or #21  | 57   |
| #23 | #22 from 2003  | 25   |

All results (25).

Cochrane reviews (2).

Other reviews (0).

Trials (23).

Methods studies (0).

Technology assessments (0).

Economic evaluations (0).

Cochrane Groups (0).



SCI and SSCI via Web of Science searched on 19/07/2013.

n.b. search reads from bottom to top.

|      |      |   |
|------|------|---|
| # 16 | 1053 | (#15) AND Language = (English)<br>Databases = SCI-EXPANDED, SSCI Timespan = 2003–2013   |
| # 15 | 2199 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 14 | 758  | TS = (((advance* NEAR/1 care NEAR/1 plan*) OR (patient NEAR/1 care NEAR/1 plan*) OR (advance* NEAR/1 directive*) OR (living NEAR/1 will*)) AND (resuscitat* OR CPR))<br>Databases = SCI-EXPANDED, SSCI Timespan = All years |
| # 13 | 0    | TS = "allow dignified death"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years   |
| # 12 | 14   | TS = "allow natural death"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years   |
| # 11 | 453  | TS = ((DNR NEAR/1 order*) OR (DNR NEAR/1 discussion*) OR (NFR NEAR/1 order*) OR (NFR NEAR/1 discussion*))<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 10 | 567  | TS = ((DNR OR NFR) AND (resuscitat* OR CPR))<br>Databases = SCI-EXPANDED, SSCI Timespan = All years   |
| # 9  | 3    | TS = DNACPR<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 8  | 106  | TS = DNAR<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 7  | 109  | TS = (CPR NEAR/2 decision*)<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 6  | 138  | TS = ("cardiopulmonary resuscitation" NEAR/2 decision*)<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 5  | 214  | TS = (resuscitation NEAR/1 order*)<br>Databases = SCI-EXPANDED, SSCI Timespan = All years   |
| # 4  | 46   | TS = "not for resuscitation"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years   |
| # 3  | 1161 | TS = "do not resuscitate"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 2  | 3    | TS = "do not attempt cardiopulmonary resuscitation"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |
| # 1  | 126  | TS = "do not attempt resuscitation"<br>Databases = SCI-EXPANDED, SSCI Timespan = All years  |

#### A.6. ASSIA via Proquest, searched on 19/07/2013

|     |   |     |
|-----|---|-----|
| S1  | SU("do not resuscitate orders")   | 74  |
| S2  | "do not attempt resuscitation"  | 14  |
| S3  | "do not attempt cardiopulmonary resuscitation"  | 0   |
| S4  | "do not resuscitate"  | 137 |
| S5  | "not for resuscitation"   | 8   |
| S10 | resuscitation PRE/2 order*  | 16  |
| S11 | "cardiopulmonary resuscitation" NEAR/2 decision*  | 13  |
| S12 | CPR NEAR/2 decision*  | 12  |
| S13 | DNAR  | 11  |
| S14 | DNACPR  | 0   |
| S15 | ((DNR OR NFR) AND (resuscitat* OR CPR))   | 65  |
| S16 | (DNR PRE/1 order*) OR (DNR PRE/1 discussion*) OR (NFR PRE/1 order*) OR (NFR PRE/1 discussion*)  | 46  |
| S17 | "allow natural death"   | 0   |
| S18 | "allow dignified death"   | 0   |
| S19 | ((advance* PRE/1 care PRE/1 plan*) OR (patient PRE/1 care PRE/1 plan*) OR (advance* PRE/1 directive*) OR (living PRE/1 will*)) AND (resuscitat* OR CPR) | 55  |
| S20 | S1 OR S2 OR S3 OR S4 OR S5 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19  | 187 |
| S22 | S20 AND la.exact("ENG") AND pd(>20030101)   | 97  |

PsycINFO via Proquest, searched on 19/07/2013.

S2 ("do not attempt resuscitation" OR "do not attempt cardiopulmonary resuscitation" OR "do not resuscitate" OR "not for resuscitation" OR (resuscitation PRE/2 order\*) OR ("cardiopulmonary resuscitation" NEAR/2 decision\*) OR (CPR NEAR/2 decision\*) OR DNAR OR DNACPR OR ((DNR OR NFR) AND (resuscitat\* OR CPR)) OR ((DNR PRE/1 order\*) OR (DNR PRE/1 discussion\*) OR (NFR PRE/1 order\*) OR (NFR PRE/1 discussion\*)) OR "allow natural death" OR "allow dignified death" OR (((advance\* PRE/1 care PRE/1 plan\*) OR (patient PRE/1 care PRE/1 plan\*) OR (advance\* PRE/1 directive\*) OR (living PRE/1 will\*)) AND (resuscitat\* OR CPR))) AND la.exact("ENG") AND pd(>20030101) 271.

#### A.7. The King's Fund Library Database, searched on 19/07/2013

N.b. This is a small database and complex searching is not possible. The results were sifted online.

Keyword: resuscitation

OR

Subject: resuscitation

OR

Title: resuscitation

Publication Date Range: 2003–

Language: English

Number: 36

#### Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.resuscitation.2014.11.016>.

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